Docket No.: 20386-00294-US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Markku Rajala et al.

Application No.: 09/806,775 Confirmation No.: 5959

Filed: July 9, 2001 Art Unit: 1731

For: METHOD AND DEVICE FOR SPRAYING OF A MATERIAL Examiner: J. M. Hoffmann

DECLARATION UNDER 37. C.F.R. §1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

I, Simo Tammela, the chief technical officer (CTO) of Liekki Oy, declare that:

1. I have a Doctor of Science (Technology) Degree in Fiber Optics, and have 23 years of experience in optical fiber amplifiers.

2. The following Table 1 presents data obtained from Corning Incorporated internet pages (http://www.corning.com/photonicmaterials/pdf/pi1409.pdf), printed on May 3, 2005. Corning Incorporated announces that they use the OVD (outside vapour deposition) process.

Table 1. Erbium-doped Fibers by Corning Incorporated (the OVD process).

Sample	Er 1550C	Er 1550C3	Er 1600L3
Peak Absorption (dB/m)	4.0 to 8.0 at 1530 nm	5.0 to 10.0 at 1530 nm	18.0 to 29.0 at 1530 nm
Cutoff Wavelength (nm)	≤ 1300	≤ 1300	≤ 1400

The original print is attached as appendix 1.

3. The following Table 2 presents data obtained from Liekki Oy, the measurements are made in Liekki Oy on January 5, 2005 and May 3, 2005. The samples "Liekki´s Er 110-4/125" and "Liekki´s Er 80-4/125" are produced by the method of the invention.

Table 2. Erbium-doped Fibers by Liekki Oy (the method of the invention).

Sample	Liekki´s Er 110-4/125	Liekki´s Er 80-4/125
Peak Absorption (dB/m)	107.4 at 1530 nm	76.7 at 1530 nm
Cutoff Wavelength (nm)	980	980
Quantum conversion efficiency (%)	29	≥ 30

4. The attached Figures 1 and 2 depict the peak absorption data presented in appendixes 2 and 3 from which the above peak absorption value in Table 2 is an extract.

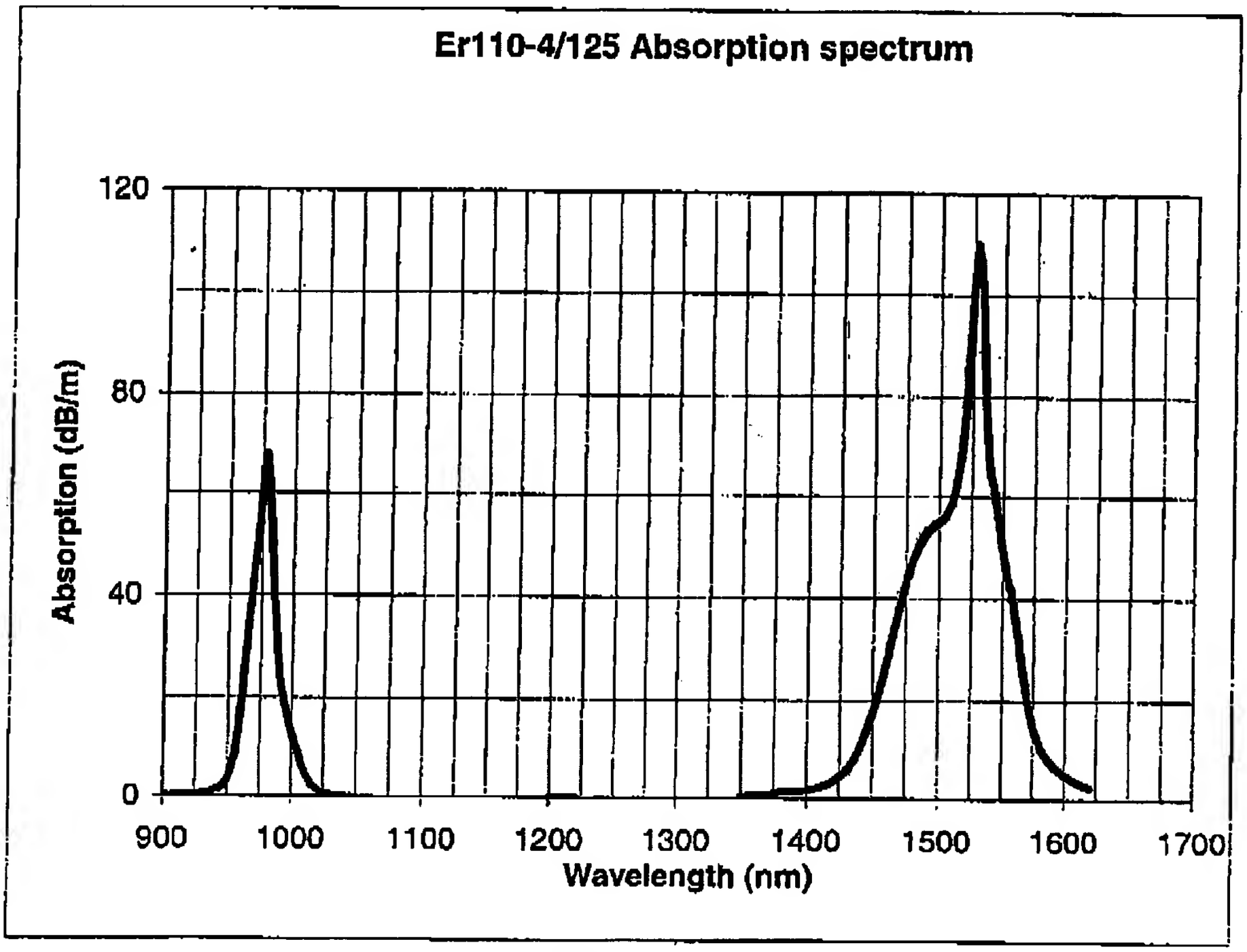

Figure 1.

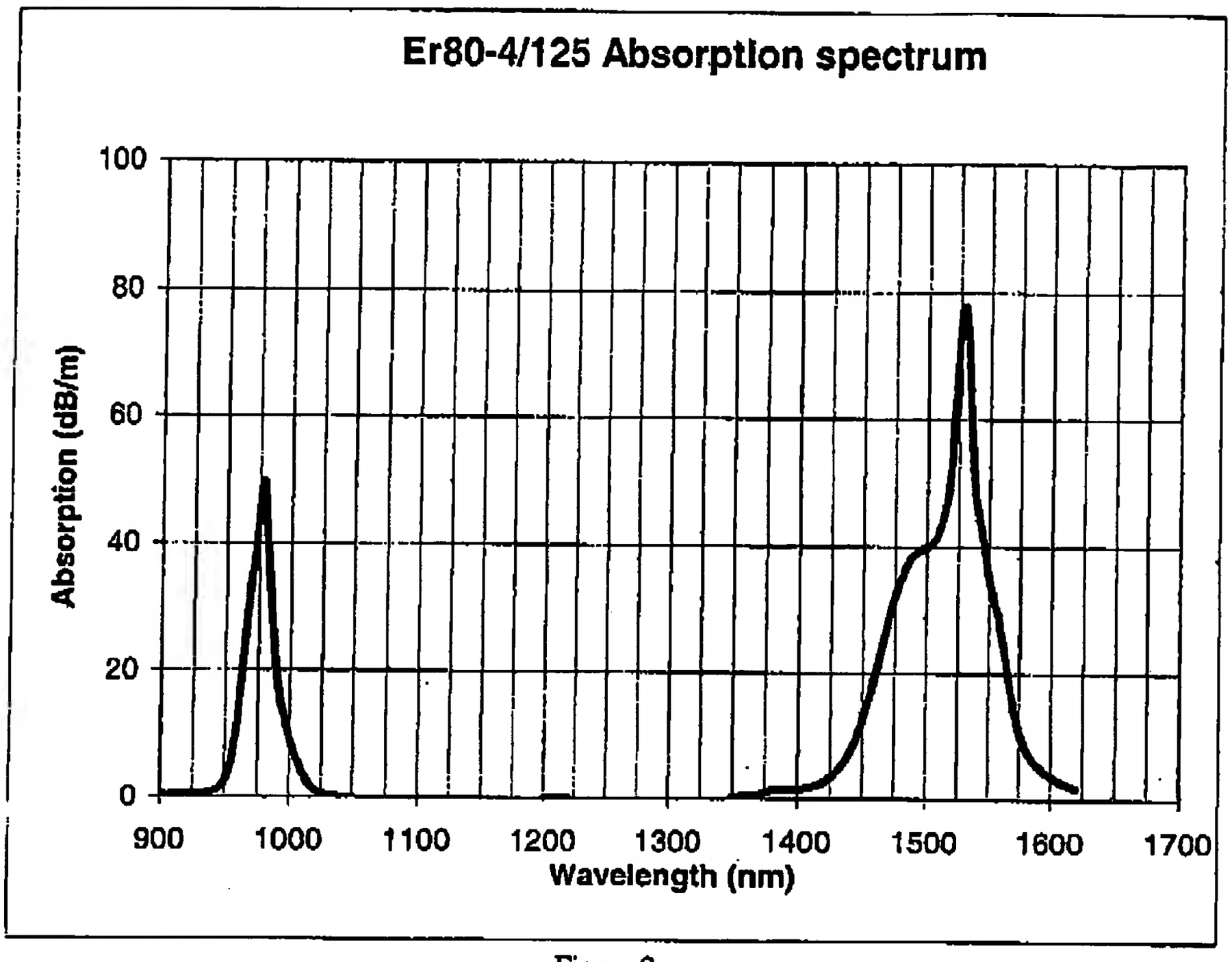

Figure 2.

5. The definitions of the the peak absorption, the cutoff wavelength and the quantum conversion efficiency are as follows:

The peak absorption is usually defined as the absorption (dB/m) at the wavelength of 1530 nm. The peak absorption reflects the amount of energy which a fiber can absorb.

The cutoff wavelength is the longest wavelength at which a single-mode fiber can transmit two modes, or the shortest wavelength at which a single-mode fiber carries only one mode. In a single mode operation light should be transmitted at wavelengths longer than the cutoff wavelength.

The quantum conversion efficiency (QCE) expresses the conversion of the pump light to the signal light at the quantum level.

6. When comparing results in Table 1 and in Table 2 it can be seen that the peak absorption of Liekki´s fiber is far better than that of Corning´s fiber. Further, the peak absorption is dependent on the cutoff wavelength. The cutoff wavelength of Liekki´s fiber is lower than the cutoff wavelength of Corning´s fiber which means that the peak absorption difference between the two fibers is even greater when the results are scaled to the same cutoff wavelength.

7. The high peak absorption means that the fiber is strongly doped with erbium. This is possible because the particles of the invention have a homogenous internal structure. The quantum conversion efficiency value shows that the fiber has high efficiency. In other words, erbium is not clustered in such a manner that the erbium ions start to interact. The clustering behaviour would impair the efficiency.

8. This strongly doped Er product family has received good acceptance by the global customers of Liekki Oy. In this product category Liekki Oy has during years 2002-2005 delivered totally 26 deliveries to 17 customers. 9 of these deliveries have been repeat orders.

Date: May 4, 2005

Respectfully submitted,

Simo Tammela

CTO

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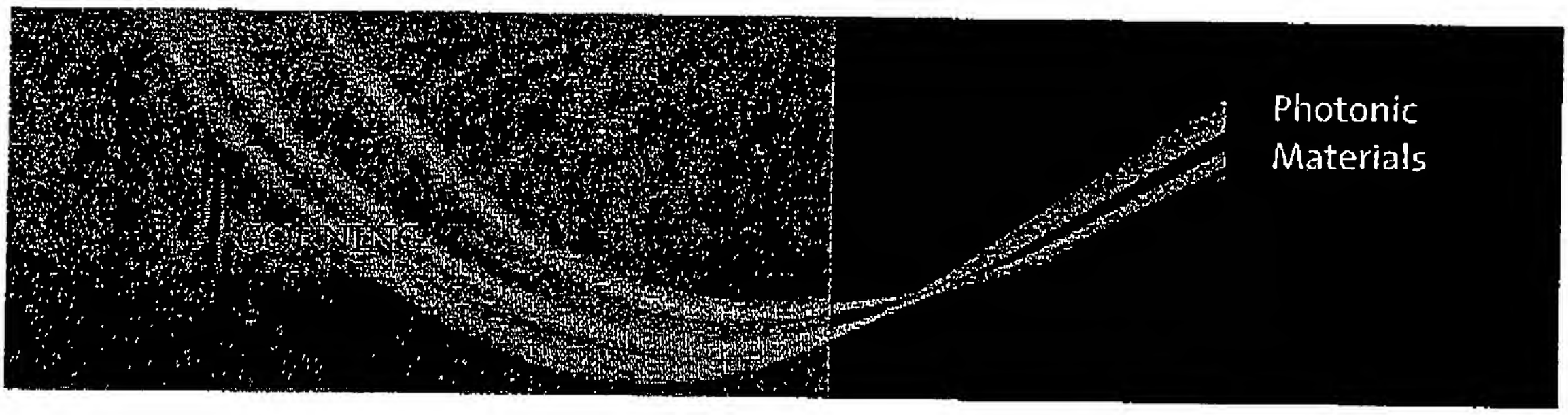
02130 ESPOO, FINLAND

Corning® Er Specialty Fibers

Erbium-doped Fibers for Use in Optical Amplifiers



PI1409
Issued: December 2003
Supersedes: August 2003

Manufactured with Corning's patented outside vapor deposition process, Corning Er Specialty Fibers set the worldwide standard for uniformity and reliability. These erbium-doped fibers have a proven track record in state-of-the-art optical amplifiers and exhibit consistently low splice loss when coupled with fibers such as Corning HI 980 and HI 1060 Specialty Fibers and Corning SMF-28® Optical Fiber. They are optimized for conventional-band (C-Band) and long-band (L-Band) optical networks.

Applications

- Single- and multi-wavelength optical amplifiers
- Digital and analog systems

Features

- Patented outside vapor deposition process provides outstanding consistency and uniformity
- Dual acrylate coating system provides superior mechanical robustness
- Excellent geometry control
- Mode-field diameter designed to match Corning High Index Specialty Fiber, allowing for efficient coupling within an EDFA
- Hermetic coating for increased environmental stability

Key Optical Specifications for C-Band Fibers

Peak Absorption Range	4.0 to 8.0 dB/m @ 1530 nm ≥ 2.5 dB/m @ 980 nm	5.0 to 10.0 dB/m @ 1530 nm ≥ 2.5 dB/m @ 980 nm
Maximum Attenuation	≤ 5 dB/km @ 1200 nm	≤ 15 dB/km @ 1200 nm
Mode-field Diameter	4.15 ± 0.55 µm @ 1000 nm 6.25 ± 0.75 µm @ 1550 nm	3.5 ± 0.2 µm @ 1000 nm 5.5 ± 0.3 µm @ 1550 nm

Key Geometric Specifications

Coating Outside Diameter	245 µm ± 10 µm	245 µm ± 10 µm

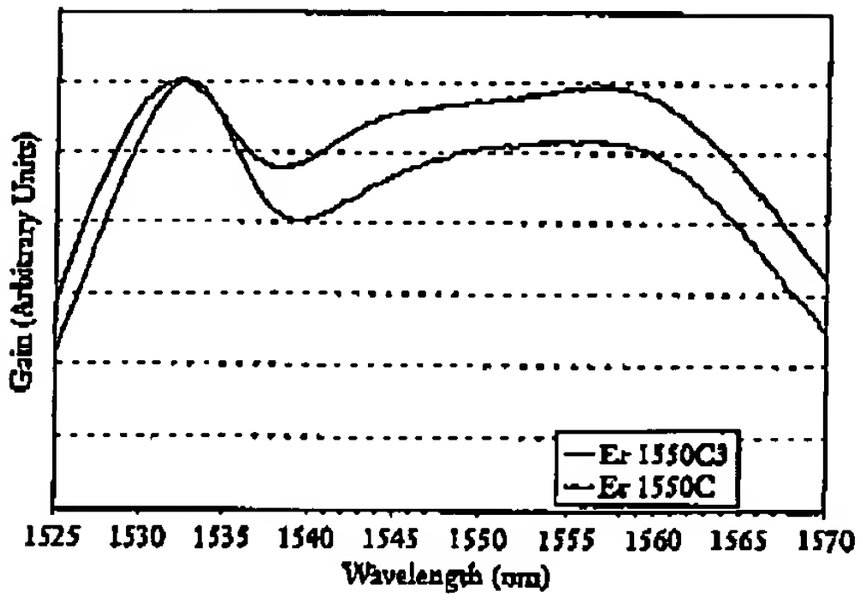
Performance Characterizations

Numerical Aperture (Typical)	0.21	0.23
Standard Lengths	100, 200, 500, 1000, 2000, 5000 m	
Backscatter	≤ 0.0001% per meter	≤ 0.0001% per meter

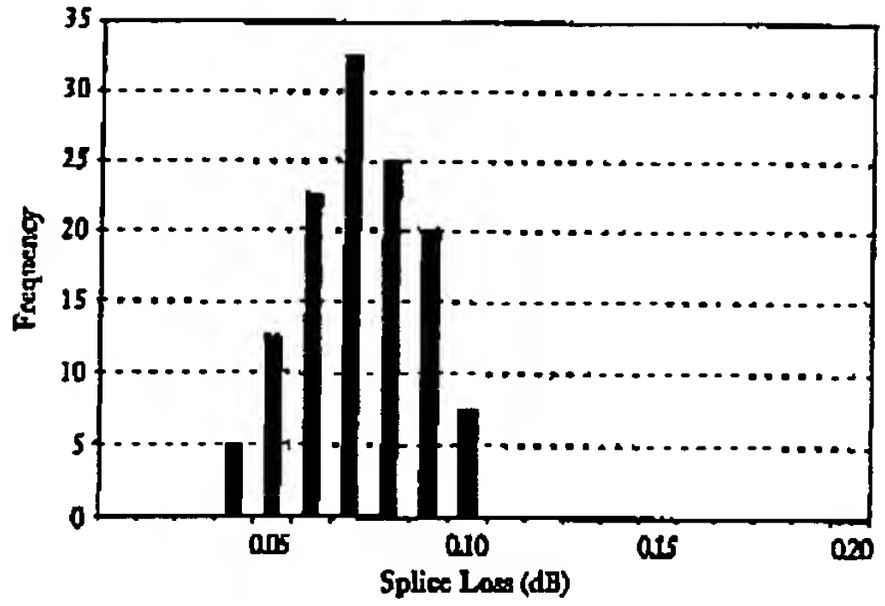
Typical Splice Loss

To Corning HI 980 Specialty Fiber	0.10 dB	0.10 dB

Typical Gain Shapes for Corning Er 1550C3 and Er 1550C Specialty Fibers



Splice Loss of Corning Er 1550C3 Specialty Fiber to SMF-28® Optical Fiber



Key Optical Specifications for L-Band Fibers

Peak Absorption Range	18.0 to 29.0 dB/m @1530 nm
Maximum Attenuation	≤ 15 dB/km @ 1200 nm
Mode-field Diameter	5.5 ± 0.3 µm @1550 nm

Key Geometric Specifications

Coating Outside Diameter	245 µm ± 10 µm

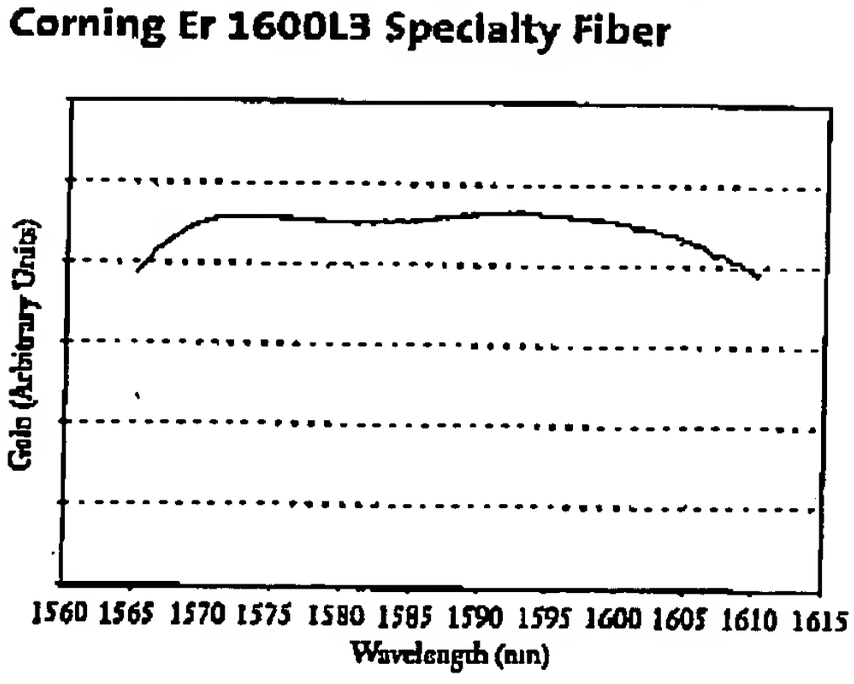
Performance Characterizations

Numerical Aperture (Typical)	0.23
Standard Lengths	100, 200, 500, 1000, 2000, 5000 m
Backscatter	≤ 0.0002% per meter
Effective Area (A_{eff})	22.5 ± 2.5 µm²

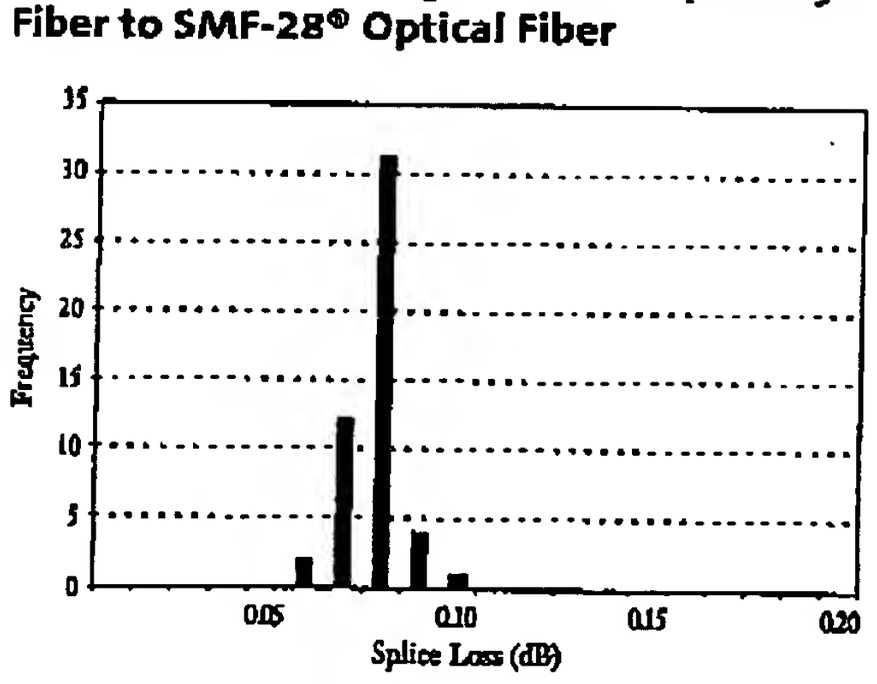
Typical Splice Loss

To Corning HI 980 Specialty Fiber	0.10 dB

Typical Gain Shape for Corning Er 1600L3 Specialty Fiber



Splice Loss of Corning Er 1600L3 Specialty Fiber to SMF-28® Optical Fiber



Corning's Outside Vapor Deposition Process

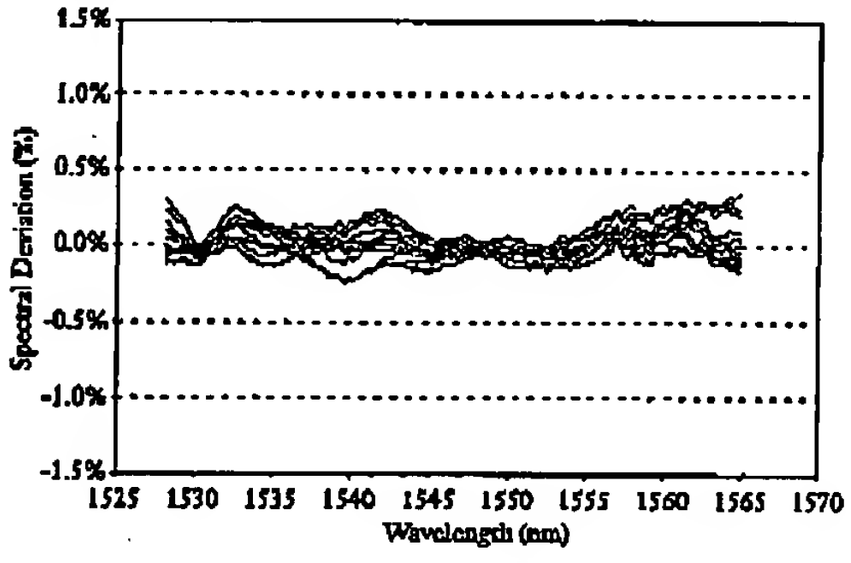
Corning's patented outside vapor deposition (OVD) manufacturing process creates the most consistent fiber in the world. Producing 100 percent synthetic glass, the OVD process greatly reduces, if not eliminates, impurities that can affect fiber performance. It also provides a greater degree of control and flexibility in fiber design. Corning is now using seventh generation outside vapor deposition technology, the most advanced in the world.

Importance of Erbium-doped Fiber Uniformity

Perhaps the most critical parameter for erbium-doped fiber in high-performance amplifiers is the uniformity of the gain spectrum from one coil of fiber to the next. Because Corning produces fiber via the OVD process, it is by far the most uniform in the world. In fact, no other company can address customer requirements with the same level of experience, capacity and precision manufacturing as Corning. In typical high-gain amplifiers built with our erbium-doped fiber, gain consistency is maximized due to the spectral uniformity of the fiber, eliminating the need for frequent adjustments to gain flattening filter design. Variations in gain spectrum and pump power requirements are greatly reduced, which makes for a more predictable amplifier manufacturing process and translates directly into lower costs for customers.

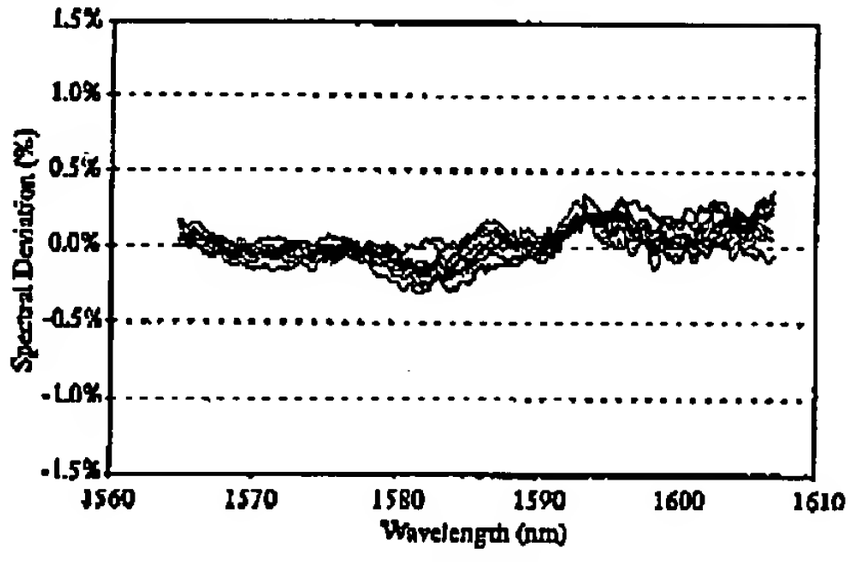
[redacted]

Spectral Uniformity of Corning Er 1550C3 Specialty Fiber



Representative samples from multiple batches totaling more than 350 km.

Spectral Uniformity of Corning Er 1600L3 Specialty Fiber



Representative samples from multiple batches totaling more than 125 km.

For More Information

For more information about Corning's leadership in specialty fiber technology, visit our website at www.corning.com/photonicmaterials.

To obtain additional technical information or an engineering sample, or to place an order for this product, please contact us:

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